

Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Listing of Claims:

1. (Currently Amended) A data processing system, comprising:

a first storage system including a first host and a first storage subsystem, wherein the first host has a first copy manager, the first copy manager being operable to manage a data replication operation, and the first storage subsystem is a disk array device including a first storage controller and first disk devices;

a second storage system including a second host and a second storage subsystem, wherein the second host has a second copy manager, the second copy manager being operable to manage a data replication operation, and the second storage subsystem is a disk array device including a second storage controller and second disk devices;

a first communication link coupling the first host system and the second host to exchange management information between the first host and the second host to manage the data replication operation, the management information including first control information transmitted from the first host to the second host; and

a data transfer path coupling the first storage subsystem and the second storage subsystem, which is configured to transfer data stored in the first

storage subsystem to the second storage subsystem to replicate the data of the first storage subsystem in the second storage subsystem, the data transfer path being different from the first communication link,

wherein the second host is configured to cause execution of the second copy manager to transfer the data from the first storage subsystem to the second storage subsystem and transfer a copy request by using the first control information received from the first host through the first communication link

wherein the second storage subsystem is configured to receive the copy request from the second host, and transmit a data transfer request to the first storage subsystem, and wherein the first storage subsystem is configured to transmit data stored in the first storage subsystem to the second storage subsystem via the data transfer path upon receiving the data transfer request from the second storage subsystem.

2- 4. (Canceled)

5. (Currently Amended) The data processing system of claim 1, wherein the first storage subsystem includes a first storage area in the first disk devices for storing data, and a second storage area in the first disk devices for storing a journal, the first storage controller being configured to write data to the first storage area according to requests from the first host and update any data image change in the first storage area to the second storage area, wherein the first storage controller is

further configured to receive the data transfer request from the second storage subsystem and transfer the journal from the second storage area to the second storage subsystem via the data transfer path upon receiving the data transfer request from the second storage subsystem, the journal including journal data and ~~meta-data~~metadata;

6. (Previously Presented) The data processing system of claim 5, wherein the second storage subsystem includes a third storage area in the second disk devices for storing the journal received from the first storage subsystem, and a fourth storage area in the second disk devices for storing data that have been restored using the journal received from the first storage subsystem, the restored data corresponding to the data stored in the first storage area, the journal including an update journal.

7. (Previously Presented) The data processing system of claim 6, wherein the data transfer path includes a storage area network, the first storage area being a logical volume associated with one or more first disk devices and the second storage areas being a logical volumes associated with one or more second disk drive devices, wherein the journal includes a base journal or a marker journal, or both.

8. (Previously Presented) The data processing system of claim 6, further comprising:

a third storage system including a third host and a third storage subsystem, the third host having a third copy manager, the third host being coupled to the first host via a communication link, the third storage subsystem being a disk array system including a third storage controller and third disks, and the third storage subsystem being coupled to the first storage subsystem via a data transfer path,

wherein the third storage subsystem is configured to receive the journal from the first storage subsystem and obtain the restored data from the journal if the second storage subsystem is unable to receive the journal or obtain the restored data.

9. (Original) The data processing system of claim 8, wherein the first host has an access to a candidate list including one or more potential storage systems that can receive the journal and obtain the restored data in place of the second storage system if the second storage system experiences a failure.

10. (Previously Presented) The data processing system of claim 1, wherein the first copy manager and the second copy manager are asynchronous copy managers, and the first storage subsystem and the second storage subsystem are provided in remote locations from each other.

11. (Canceled)

12. (Previously Presented) A data processing system, comprising:

- a first storage system including a first host and a first storage subsystem, the first host having access to a first copy manager, the first copy manager being operable to manage a data replication operation;
- a second storage system including a second host and a second storage subsystem, the second host having access to a second copy manager, the second copy manager being operable to manage a data replication operation;
- a first communication link coupling the first host and the second host to exchange management information between the first and second hosts to manage the data replication operation, the management information including first control information transmitted from the first host to the second host; and
- a data transfer path configured to transfer data stored in the first storage subsystem to the second storage subsystem and replicate the data of the first storage subsystem in the second storage subsystem, the data transfer path being different from the first communication link,

wherein the second host is configured to cause execution of the second copy manager using the first control information to initiate transfer of the data from the first storage subsystem to the second storage subsystem,

wherein the data transfer path includes a first data link coupling the first storage system to a first external storage device for transferring the data from the first storage system to the first external storage device,

wherein the data transfer path further includes: a second data link coupling the second storage system to a second external storage device, the second external storage device configured to receive the data from the first storage system stored in the first external storage device, so that the data from the first storage system can be transferred to the second storage system.

13. (Previously Presented) A method for performing a remote replication in a data processing system including a first storage system including a first host and a first storage subsystem and a second storage system including a second host and a second storage subsystem, the method comprising:

transmitting a completion notification from the second storage subsystem to the second host to inform the second host that the second storage subsystem has finished receiving first information from the first storage subsystem via a data transfer link coupling the first and second storage subsystems;

receiving at the second storage subsystem a restore command from the second host to obtain second information using the first information, the second information being associated with the first information; and

performing a restoration process to obtain the second information at the second storage subsystem upon receiving the restore command, the second information being a copy of data stored in the first storage subsystem,

wherein the first and second hosts are coupled to each other via a communication link to transmit or receive management information relating to the remote replication method.

14. (Currently Amended) The method of claim 13, further comprising:
storing the second information in a first storage area of the first storage subsystem according to an instruction of the first host;

thereafter, storing the first information that is associated with the second information in a second storage area of the first storage subsystem; and

informing the first host that the first storage subsystem is ready to transfer the first information to the second storage subsystem once a given amount of the first information is stored in the second storage area,

wherein a data transfer notification is sent from the first host to the second host informing the second host that the first storage subsystem is ready to transfer the first information to the second storage subsystem,

wherein the first information is a journal, the journal including journal data and ~~meta-data~~metadata, the journal data corresponding to the second information.

15. (Previously Presented) A method for storing data in a storage system, the method comprising:

storing data in a first storage area in a first storage subsystem of a first storage system according to an instruction of a first host associated with the first storage subsystem, the first storage system including the first host and the first subsystem;

storing an update journal in a second storage area in the first storage subsystem, the update journal corresponding to the data stored in the first storage area, the update journal including journal data and metadata;

notifying the first host that the first storage subsystem is ready to transfer the update journal to a second storage system, so that the first host can inform the second storage system via a first communication link that the first storage subsystem is ready to transfer the update journal to the second storage system, the first communication link being configured to exchange management information between the first host and the second storage system; and

transferring a journal including the update journal to the second storage system via a data transfer path that is different from the first communication link.

16. (Original) The method of claim 15, wherein the second storage system including a second host and a second storage subsystem, the first communication link being an IP network, the data path being a Fibre Channel, the first and second storage subsystems being disk array devices, the method further comprising:

storing a base journal in the second storage area that is derived from at least a portion of initial data that had been stored in the first storage area prior to the storing-data-in-a-first-storage-area step, the journal transferred to the second storage system further including the base journal;

receiving a notification at the first host from the second host via the first communication link coupling the first and second hosts, the notification informing the first host that the journal has been received by the second storage subsystem;

transmitting an instruction to the first storage subsystem from the first host to prepare the second storage area for storing new information therein.

17. (Previously Presented) A computer readable medium for managing a data processing system, the medium comprising:

code for storing data in a first storage area in a first storage subsystem of a first storage system according to an instruction of the a first host that is associated with the first storage subsystem, the first storage system including the first host and the first subsystem;

code for storing a journal in a second storage area in the first storage subsystem, the journal corresponding to the data stored in the first storage area, the journal including journal data and metadata;

code for notifying the first host that the first storage subsystem is ready to transfer the journal to a second storage system, so that the first host, in turn, can notify the second storage system via a first communication link that the first storage

subsystem is ready to transfer the journal to the second storage system, the first communication link being configured to exchange management information between the first host and the second storage system; and

code for transferring the journal information to the second storage system via a data transfer path that is different from the first communication link.

18. (Currently Amended) A storage subsystem provided in a data processing system, the data processing system including a first storage system and a second storage system, the first storage system including a host and the storage subsystem, wherein the storage system comprising:

a storage controller to communicate with the host that is coupled to a remote host of a remote storage system via a first communication link, the first communication link being configured to exchange management information between the host of the storage subsystem and the remote host of the remote storage system;

a first storage area to store data according to an instruction of the host of the storage subsystem;

a second storage area to store a journal corresponding to the data stored in the first storage area, the journal including journal data and ~~meta data~~metadata; and

a communication interface coupled to a second communication link, the second communication link coupling the storage subsystem and a remote storage

unit of the remote storage system, the second communication link being configured to transfer the journal to the remote storage unit and being different than the first communication link,

wherein the storage subsystem is configured to notify the host when the storage subsystem is ready to transfer the journal stored in the second storage area to the remote storage unit.

19. (Original) A data processing system, comprising:

a primary storage system including a primary host and a primary storage subsystem, the primary storage subsystem being configured to perform an asynchronous remote replication procedure, the primary storage subsystem including a first storage area for storing data and a second storage area for storing a journal corresponding to the data;

a secondary storage system including a secondary host and a secondary storage subsystem, the secondary subsystem being configured to perform an asynchronous remote replication procedure, the secondary storage subsystem including a third storage for receiving and storing the journal from the primary storage subsystem and a fourth storage for storing data that has been restored using the journal received from the primary storage subsystem, the restored data being a copy of the data stored in the first storage area;

a first communication link coupling the primary host and the secondary host to exchange management information; and

a second communication link coupling the primary storage subsystem and the secondary storage subsystem to exchange data between the primary and secondary storage subsystems,

wherein the primary host is configured to provide management information about the journal stored in the second storage area to the secondary host via the first communication link;

wherein the secondary host is configured to instruct the secondary storage subsystem to obtain the restored data from the journal received from the primary storage subsystem upon receiving a notification that a receipt of the journal has been completed from secondary storage subsystem,

wherein the primary storage subsystem is configured to retrieve the journal from the second storage area and transfer the journal to the secondary storage system via the second communication link upon receiving a data transfer request or determining a predetermined condition has been satisfied.

20. (Original) The data processing system of claim 19, wherein the primary storage subsystem is manufactured by a first vendor and the secondary subsystem is manufactured by a second vendor different from the first vendor, the first and second communication links being the same communication network.